# Multiply and Divide Decimals with and without Rounding

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# CONCEPT **1** Multiply and Divide Decimals with and without Rounding

Here you'll learn to multiply and divide decimals with and without rounding.



The students decided to divide up the tasks of ordering. Each pair needed to work on figuring out a reasonable purchase price and quantity for the item that they were assigned. Then keeping the budget in mind the students would present their item, purchase price and quantity purchased to the team.

Mallory and Trevor are working on ordering pencils.

"Wow, there are a lot of different ones to choose from," Mallory said looking through a catalog of pencils.

"There sure is, but I think that we should go for the number 2 ones with our school name on them. Those are sure to sell," Trevor said pointing to a blue and red pencil in the catalog.

"I agree. Now let's figure out the cost. It says here that we can buy a case of 25 boxes of pencils and each box has 144 pencils in it for $196.08. That seems like a good deal."

"Yes, but we are going to need to order two cases so that we are sure that we have enough," Trevor said as he began multiplying. "Why don't you work on figuring out the cost per box if we order 25 for $196.08?"

"Okay, you do the other part," Mallory said as she began her division problem.

**There are two parts to this problem. One involves multiplying decimals that is the part that Trevor is working on and the other requires a division of decimals. Mallory is working on the second part of the problem. To complete these two problems, you will need to know about multiplying and dividing decimals. You will learn what you need to know in this Concept.**

## Guidance

Now you'll learn how to multiply and divide decimals. Let's start with multiplying decimals.

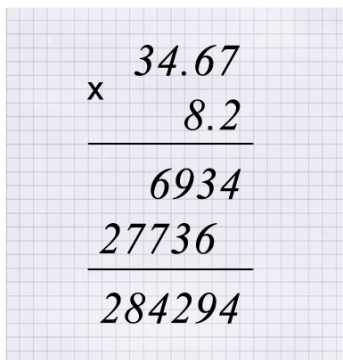**Do you remember how to multiply whole numbers with several digits?**

**Well, we are going to multiply decimals in the same way. Don't worry about the decimal point in the beginning. We will work with it in the product.**

*Multiply:* $34.67 \times 8.2$

We can multiply decimals like we multiply whole numbers. First, ignore the decimal points and line up the numbers from the right.

$$34.67$$
$$\underline{\times 8.2}$$

Now multiply each digit in the top number by each digit in the bottom number, just like whole numbers.

$$
\begin{array}{r}
34.67 \\
\times \quad 8.2 \\
\hline
6934 \\
\underline{27736} \\
284294
\end{array}
$$

Now place the decimal point in the product by counting the number of decimal places in each of the numbers that were multiplied. The first number has two decimal places, and the second number has one decimal place. So move the decimal point three places.

$$284.294$$
$$\quad\quad\quad 3\;2\;1$$

**The product is 284.294.**

**What about division?**

**We can divide decimals too. When we divide decimals, we have to pay attention to the decimal point.**

*Divide:* $253.26 \div 4.5$

We can divide decimals like we divide whole numbers. First, move the decimal point so that the divisor, 4.5, is a whole number. Then move the decimal point in the dividend, 253.36, the same number of places and write out the problem in long division. Notice that the first number is the dividend. **The *dividend* is the number being divided** so it goes into our division box. The other number is the divisor. **The *divisor* is the number doing the dividing.**

$$45\overline{)2532.6}$$

Now ignore the decimal point and divide as you would divide whole numbers. Then place the decimal point in the quotient directly above the decimal point in the dividend.



Notice that we had to add a zero into the dividend so that our quotient would be even.

**The answer is 56.28.**

**You have probably worked on multiplying and dividing decimals in past math classes. However, it is always a skill worth practicing because of how many times you will work with decimals in real-life. We can also estimate products and quotients of decimals.**

To estimate products and quotients with decimals, you need to first round the numbers so that they are easier to work with. To round to the nearest whole number, look at the digit in the tenths place. If it is less than 5, round down. If it is 5 or greater, round up.

**Remember that an *estimate* is an answer that is not exact, but is approximate and reasonable.**

*Estimate the product:* $11.256 \times 6.81$

First, we round the first number. Since there is a 2 in the tenths place, 11.256 rounds down to 11.

Now round the second number. Since there is an 8 in the tenths place, 6.81 rounds up to 7.

Now multiply the rounded numbers.

$11 \times 7 = 77$

**A good estimate for the product is 77.**

Now let's estimate using division.

*Estimate the quotient:* $91.93 \div 4.39$

First we round the first number. Since there is a 9 in the tenths place, 91.93 rounds up to 92.

Now round the second number. Since there is a 3 in the tenths place, 4.39 rounds down to 4.

Now divide the rounded numbers.

$92 \div 4 = 23$

**A good estimate for the quotient is 23.**

### Example A

$16.39 \div 2.2 =$ _____

**Solution:** 7.45

**Example B**

$15.18 \div 2.2 =$ _____

**Solution:** 6.9

**Example C**

$14.50 \times 2.1 =$ _____

**Solution:** 30.45

Now let's go back to the dilemma from the beginning of the Concept.

We can start with Trevor. Trevor needed to find a product. To estimate, he could round the cost of the case of pencils. Then he wants to order two cases, so he would multiply this rounded dollar amount by 2.

$196.08 rounds to $200.00

$200 \times 2 = 400$

**The estimate is about $400.00 for two cases.**

Now let's look at the actual product.

$$\begin{array}{r} \$196.08 \\ \times \quad\quad 2 \\ \hline \$392.16 \end{array}$$

**You can see that our estimate was reasonable for the actual answer.**

Next, we can work with Mallory. Mallory needed to figure out the price per box if there are 25 boxes in a case for $196.08.

It makes sense for her to round the dollar amount first to find an estimate.

$196.08 rounds to $200.00

$200 \div 25 = 8$

**Each box costs roughly $8.00.**

Now let's find the quotient.

$196.08 \div 25 = \$7.84$ *per box*

**You can see that our estimate was reasonable given the quotient.**

### Vocabulary

**Dividend**
    the number being divided in a division problem. It is often the first number in a problem written horizontally.

**Divisor**
    the number doing the dividing in a division problem.

**Estimate**
    an approximate answer that is reasonable and makes sense for the problem.

## Guided Practice

Here is one for you to try on your own.

Avi bought five new telephones for the school office. They cost $61.35 each. If the price includes tax, estimate how much Avi spent? What is the exact amount that Avi spent?

**Solution**

Round each decimal to a number that is easy to multiply. Then find the sum.

5 does not need to be rounded.

61.35 rounds down to 60.

$5 \times 60 = 300$

**Avi spent about $300. This is our estimate.**

Now find the exact amount.

$5 \times 61.35 = \$306.75$

**This is the exact amount that Avi spent.**

## Video Review



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## Practice

<u>Directions:</u> Estimate each product using rounding.

1. $2.67 \times 3.10 = \_\_\_\_$
2. $4.15 \times 8.09 = \_\_\_\_$
3. $6.67 \times 7.10 = \_\_\_\_$
4. $8.21 \times 9.87 = \_\_\_\_$
5. $5.86 \times 5.13 = \_\_\_\_$
6. $5.86 \times 5.13 = \_\_\_\_$
7. $6.35 \times 12.01 = \_\_\_\_$
8. $4.13 \times 9.87 = \_\_\_\_$
9. $8.12 \times 9.15 = \_\_\_\_$
10. $16.21 \times 9.94 = \_\_\_\_$

<u>Directions:</u> Estimate each quotient using rounding.

11. $21.87 \div 2.1 = \_\_\_\_$

12. $32.14 \div 8.03 =$ _____
13. $36.07 \div 8.83 =$ _____
14. $16.20 \div 7.92 =$ _____
15. $34.87 \div 5.03 =$ _____
16. $18.08 \div 3.14 =$ _____
17. $21.10 \div 3.17 =$ _____
18. $44.82 \div 8.60 =$ _____
19. $120.02 \div 58.72 =$ _____
20. $139.87 \div 69.81 =$ _____

Directions: Multiply or divide to find each product or quotient.

21. $13.64 \div 2.2 =$ _____
22. $21.35 \div 6.1 =$ _____
23. $5.2 \times 6.3 =$ _____
24. $6.7 \times 4.3 =$ _____
25. $.437 \times 2.1 =$ _____